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2628	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/661,645	OHBA ET AL.	
	Examiner	Art Unit	
	Jason M. Repko	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *8/14/2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claims 20 and 22 rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

3. Claims 20 and 22 are directed to a "carrier wave," which is nothing but the physical characteristics of a form of energy, and as such is nonstatutory natural phenomena. A carrier wave does fall within any of the four categories of invention. It is noted that claim 20 does not expressly recite "carrier wave"; however, a storage medium as defined in the descriptive portion of the specification does not exclude nonstatutory natural phenomena.

4. To expedite a complete examination of the instant application, the claims rejected under 35 U.S.C. 101 as non-statutory subject matter are further rejected as set forth below in anticipation of applicant amending the claims to place them within the four categories of invention.

Specification

5. The outstanding objections to the specification are withdrawn.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1-4 and 7-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,966,134 to Arias in view of Barbra J. Meier, "Painterly Rendering for Animation," Aug. 4, 1996, SIGGRAPH '96 Conference Proceedings, p. 477-484 (Meier).

10. With regard to claim 1, Arias discloses "an image generating method for rendering in real-time a three-dimensional object viewed from a predetermined viewpoint by generating an image of the three-dimensional object and writing color information on the image generated in a rendering buffer, the method comprising:

a. generating at least one retouched image of the three-dimensional image by arranging colored lines and soft edged black lines within a rendering region for the three-dimensional object, the rendering region on which the three-dimensional object is projected on the basis of the predetermined viewpoint (*lines 5-8 of column 13: "...the data in FB1 are composited by combining the data with the composited data stored in the RGBA frame buffer, which were defined by the last step in column 142."; lines 37-39 of column 2: "The colored image, color lines, and contour lines are composited to produce the cel image."; lines 33-35 of column 12: "The surface-normal vector frame buffer therefore is a record of the shapes of the objects seen by an imaginary camera viewing the scene."*);

b. generating a projection image by projecting the three-dimensional object on the basis of the predetermined viewpoint (*Figure 3; lines 7-10 of column 8: "The Toon_Paint shader is called for each intersection of a primary ray with the surface to determine the color (RGB components and alpha value) associated with the pixel for storage in the frame buffer."*); and

c. rendering the image of the three-dimensional object so as to reflect color information of the projection image at a part at which the retouched image is transparent (*lines 13-16 of column 12: "The resulting image typically includes soft-edged black lines disposed between the differently colored regions determined previously using the Toon_Paint material shader."*) by synthesizing the retouched image with the projection image" (*lines 8-13 of column 12: "Finally, the color lines that have been smoothed by the previous step and stored as data in FB1 are composited with the colored image defined*

by the RGBA values. As indicated in column 142, for each pixel at location x,y, a new RGBA value is determined that is equal to the product of the RGBA value and the value stored in FB1 for the pixel at location x,y. ").

11. Arias discloses rendering in the style of cel animation, and consequently, Arias does not disclose arranging "brush images." Meier discloses "generating at least one of retouched image (*Figure 3 shows an output image*) of the three-dimensional image by arranging a plurality of brush images (*Figures 3 and 4 show brush images; 3rd paragraph of section 3.3: "For example, we may specify that brush rotations be determined by an orientation reference picture…"; 8th paragraph of section 3.2: "To apply the attributes, the brush image is either used directly or cut from a sheet of texture…rotated to the orientation…*") so as to superpose a part of the plurality of brush images on one another part of the plurality of brush images within a rendering region for the three-dimensional object, the rendering region being a region in which the three-dimensional object is projected on the basis of the predetermined viewpoint (*2nd paragraph of section 3: "We begin by creating a particle set that represents geometry such as a surface… We use a painter's algorithm to render particles as 2d brush strokes starting with the particles furthest from the viewpoint, and continuing until all particles are exhausted. Each brush stroke renders one particle."*).

12. Arias and Meier are analogous art because they are from the same field of endeavor: non-photorealistic rendering. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to generate a retouched image by employing the rendering algorithm disclosed by Meier and use this retouched image in the system disclosed by Arias. The motivation for doing so would have been to simulate brush strokes as suggested by Meier, in the

section paragraph of section 1, "brush strokes of a painting contribute to the abstraction of its subject and add another dimension to which a viewer can respond." Therefore, it would have been obvious to combine Arias with Meier to obtain the invention specified in claim 1.

13. Claim 21 recites limitations similar in scope to those of claim 1. The limitations of claim 1 were shown to be met by the combination of Arias and Meier. Furthermore, Arias discloses an image generating apparatus (*Figure 1*).

14. With respect to claims 20 and 22, the storage medium, data signal, and program recited in claims 20 and 22, respectively, are comprised by the apparatus shown by Arias in Figure 1 and in lines 5-20 of column 5. As previously shown, the combination of Arias and Meier shows the method recited in claim 1.

15. With regard to claim 2, Arias further discloses "generating an edge image of the three-dimensional object on the basis of the predetermined viewpoint (*lines 17-22 of column 12: "Columns 144 and 146 in FIG. 8 respectively define the general steps and related details for determining the lines that define surface contours for the toon look image that is being produced. As noted above, contour lines follow the outlines of an object as well as defining curves on its interior surfaces."; lines 33-35 of column 12: "The surface-normal vector frame buffer therefore is a record of the shapes of the objects seen by an imaginary camera viewing the scene."*), wherein the rendering the image of the three-dimensional object includes rendering the image of the three-dimensional object by synthesizing the retouched image, the projection image and the edge image" (*lines 37-39 of column 2: " The colored image, color lines, and contour lines are composited to produce the cel image."*).

16. At the time of the invention, it would have been obvious to one of ordinary skill in the art to further modify the combination of Arias and Meier to incorporate an edge image, as further taught by Arias. The motivation for doing so would have been to clearly define the edges of objects in the scene to distinguish it from its surroundings, as well as give the image a "toon look" quality. Therefore, it would have been obvious to further modify the combination of Arias and Meier to obtain the invention specified in claim 2.

17. Claim 3 is met by the combination of Arias and Meier, wherein Meier discloses "setting a light source in an object space in which the three-dimensional object is provided; and calculating shadow information of the three-dimensional object by performing predetermined rendering processing on the basis of the predetermined viewpoint and the light source set (*3rd paragraph of section 3.2: "The reference picture used for color information is typically a smooth-shaded rendered image of the surface with appropriate color attributes and lighting."; Figure 2 shows "create reference pictures using geometry, surface attributes, and lighting; Figure 3 shows shading the geometry to create a color reference image; Figure 8 shows shadow information*), wherein the arranging a plurality of brush images so as to superpose a part of the plurality of brush images on one another part of the plurality of brush images includes determining arrangement positions at which the plurality of brush images are arranged on the basis of the shadow information calculated (*Figure 8 shows brush images arranged according to shadow information; 3rd paragraph of section 5.1: "...shadows may be painted as a separate layer and composited..."*).

18. Claim 4 is met by the combination of Arias and Meier, wherein Meier discloses "the arranging a plurality of brush images so as to superpose a part of the plurality of brush images on

one another part of the plurality of brush images includes determining the arrangement positions for the plurality of brush images so that density of the plurality of brush images in a low brightness part is higher than density of the plurality of brush images in a high brightness part on the basis of the shadow information calculated" (*6th paragraph of section 3.2 (emphasis added): "We linearly map the range of values in the image to the range of user-specified sizes so that the areas with small values are painted with the smallest brushes and the areas with high values are painted with the largest brushes. Again, we can use* *lighting, texture maps, or specialized shaders* *to achieve the desired look."*). One of ordinary skill in the art would recognize the "lighting, texture maps, or specialized shaders" are analogous to shadow information as broadly recited in claim 4.

19. Claim 7 is met by the combination of Arias and Meier, wherein Meier discloses "the generating at least one of retouched image of the three-dimensional image includes generating at least one of retouched image by changing brightness information of the plurality of brush images on the basis of shadow information at positions at which the plurality of brush images are arranged" (*8th paragraph of section 3.2 (emphasis added): "To apply the attributes, the brush image is either used directly or cut from a sheet of texture,* *multiplied by the color*...*corresponding reference picture or by data stored with the particle."; Figure 8 shows brightness of a brush image corresponding to the shadow information*). One of ordinary skill in the art would recognize from Figure 3 and Figure 8, color attributes from the rendered reference picture correspond to the brightness of the brush image.

20. Claim 8 is met by the combination of Arias and Meier, wherein Meier discloses "the generating at least one of retouched image of the three-dimensional image includes:

d. operating a normal line to a surface of the three-dimensional object (*5th paragraph of section 3.2: "The reference picture that encodes orientation information is an image made with a specialized shader that encodes surface normals in the resulting image. This surface normal shader projects the 3d surface normals into two dimensions along the view vector or another specified vector."*); and

e. performing processing for determining an arrangement angle of each of the plurality of brush images on the basis of the normal line operated for a position on the surface of the three-dimensional object (*3rd paragraph of section 3.3: "For example, we may specify that brush rotations be determined by an orientation reference picture..."; 8th paragraph of section 3.2: "To apply the attributes, the brush image is either used directly or cut from a sheet of texture...rotated to the orientation..."*),

f. the position corresponding to an arrangement position at which each of the plurality of brush images is arranged, and arranging each of the plurality of brush images at the arrangement angle determined (*Figure 3 caption: "The renderer looks up brush stroke attributes in the reference pictures at the screen space location given by each particle's position and renders brush strokes that are composited into the final rendered image."*).

21. With regard to claim 9, Meier further teaches "executing predetermined rendering processing on the basis of the predetermined viewpoint (*Figure 3 caption: "The surface geometry is rendered using various shaders to create brush stroke attribute reference pictures."; 5th paragraph of section 3.2: "The reference picture that encodes orientation information is an image made with a specialized shader that encodes surface normals in the resulting image. This*

surface normal shader projects the 3d surface normals into two dimensions along the view vector or another specified vector."), and generating a normal image expressing the normal line to the surface of the three-dimensional object in color information (*Figure 3 caption: "Note that the arrows in the orientation image are representational in this diagram; the orientations are actually encoded in the color channels of the image."*), and arranging each of the plurality of brush images includes performing processing for determining the arrangement angle of each of the plurality of brush images (*3rd paragraph of section 3.3: "For example, we may specify that brush rotations be determined by an orientation reference picture... "; 8th paragraph of section 3.2: "To apply the attributes, the brush image is either used directly or cut from a sheet of texture...rotated to the orientation... "*), on the basis of color information at a position of the normal image, the position corresponding to the arrangement position at which each of the plurality of brush images is arranged, and arranging each of the plurality of brush images at the arrangement angle determined (*Figure 3 caption: "The renderer looks up brush stroke attributes in the reference pictures at the screen space location given by each particle's position and renders brush strokes that are composited into the final rendered image."*).

22. Although Meier discloses a shader, Meier does not expressly disclose emitting light rays from multiple light sources. Arias discloses "providing a first light source for emitting light rays in a first direction crossing at a right angle with an eyes line direction of the predetermined viewpoint and a second light source for emitting light rays in a second direction crossing at a right angle with the eyes line direction of the predetermined viewpoint, irradiating the light rays emitted from the first light source and the light rays emitted from the second light source to the three-dimensional object" (*lines 59-66 of column 6: "As shown in this simplified illustration, a*

primary light ray 76 is cast toward an object 72 for one pixel of a frame 70. In the rendering process, rays are cast from each pixel toward the object, but only one is shown in this simplified view. The primary rays are cast into the scene in a direction determined by the ray tracing program or by a "lens shader" interposed between the light source and the object being rendered. "; lines 8-11 of column 7: "Thus, if additional light sources illuminate the object, additional rays are cast to the ray/surface intersection point from the light sources so that the material color is determined by summing the contribution of each light source.").

23. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the shader operations as disclosed by Arias in Meier's shader (*Figure 3*). The motivation for doing so would have been create realistic reference images by simulating the physical transport of light, as suggested by Meier in Figure 2 and Figure 3. Therefore, it would have been obvious to further modify the combination of Arias and Meier to obtain the invention specified in claim 9.

24. With regard to claim 10, Meier further discloses "the image generating method as claimed in claim 9, wherein

g. the operating the normal line to the surface of the three-dimensional object includes generating the normal image, executing the predetermined rendering processing (*5th paragraph of section 3.2: "This surface normal shader projects the 3d surface normals into two dimensions along the view vector or another specified vector."*), and

h. operating values of each of pixels of the surface of the three-dimensional object, and the arranging each of the plurality of brush images includes determining the arrangement angle of each of the plurality of brush images at the arrangement position at

which each of the plurality of brush images are arranged by operating a direction corresponding to the normal line at the arrangement position (*Figure 3 caption: "The renderer looks up brush stroke attributes in the reference pictures at the screen space location given by each particle's position and renders brush strokes that are composited into the final rendered image. "; 3rd paragraph of section 3.3: "For example, we may specify that brush rotations be determined by an orientation reference picture... "; 8th paragraph of section 3.2: "To apply the attributes, the brush image is either used directly or cut from a sheet of texture...rotated to the orientation... "*)

i. at which each of the plurality of brush images is arranged on the basis of a value of the light ray color of the first light source and a value of the light ray color of the second light source of values of the normal image (*Figure 3 caption: "...the orientations are actually encoded in the color channels of the image."*).

25. Meier does not expressly disclose "the rendering buffer is formed so as to store RGB values for every pixel," and "generating the normal image, by setting a light ray color of the first light source to be a first color of RGB and a light ray color of the second light source to be a second color of the RGB other than the first color."

26. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate the features of "the rendering buffer is formed so as to store RGB values for every pixel," and "generating the normal image, by setting a light ray color of the first light source to be a first color of RGB and a light ray color of the second light source to be a second color of the RGB other than the first color" in the system disclosed by the combination of Arias and Meier. As shown, Meier discloses the normals are two dimensional (*5th paragraph of*

section 3.2 (emphasis added): "This surface normal shader projects the 3d surface normals into two dimensions along the view vector or another specified vector.") and stored in the color channels of the image (*Figure 3 caption: "...the orientations are actually encoded in the color channels of the image."*); therefore, the motivation for doing so would have been to simplify implementation of the system by conveniently storing the components within the existing framework (images comprising pixels with RGB channels), and by ensuring a one-to-one correspondence between orientation attributes and brush image locations by providing a value at each location in the rendering buffer. Therefore, it would have been obvious to combine Arias with Meier to obtain the invention specified in claim 10.

27. Claim 11 is met by the combination of Arias and Meier, wherein Meier discloses "further comprising operating a direction from a predetermined position of the normal image generated to the arrangement position at which each of the plurality of brush images is arranged, wherein the determining the arrangement angle of each of the plurality of brush images includes determining the arrangement angle of each of the plurality of brush images (*3rd paragraph of section 3.3: "For example, we may specify that brush rotations be determined by an orientation reference picture..."; 8th paragraph of section 3.2: "To apply the attributes, the brush image is either used directly or cut from a sheet of texture...rotated to the orientation..."*) by synthesizing the direction operated with a direction obtained on the basis of the color information of the normal image" (*5th paragraph of section 3.2: "The reference picture that encodes orientation information is an image made with a specialized shader that encodes surface normals in the resulting image. This surface normal shader projects the 3d surface normals into two dimensions along the view vector or another specified vector."; Figure 3 caption: "Note that the arrows in*

the orientation image are representational in this diagram; the orientations are actually encoded in the color channels of the image.").

28. With respect to claim 12, Meier further discloses "setting a light source in an object space in which the three-dimensional object is provided (*3rd paragraph of section 3.2: "The reference picture used for color information is typically a smooth-shaded rendered image of the surface with appropriate color attributes and lighting."; the algorithm in Figure 2 shows the step of "create reference pictures using geometry, surface attributes, and lighting"; Figure 3 shows shading the geometry to create a color reference image*); wherein the arranging each of the plurality of brush images includes determining the arrangement angle of each of the plurality of brush images by synthesizing a view direction with the normal line to the surface of the three-dimensional object" (*5th paragraph of section 3.2: "This surface normal shader projects the 3d surface normals into two dimensions along the view vector or another specified vector."; 3rd paragraph of section 3.3: "For example, we may specify that brush rotations be determined by an orientation reference picture..."; 8th paragraph of section 3.2: "To apply the attributes, the brush image is either used directly or cut from a sheet of texture...rotated to the orientation..."*). Meier does not disclose the "specified vector" is a "light ray direction of the light source set."

29. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a light ray direction of the light source set as the specified vector in the method disclosed by Meier. The motivation for doing so would have been to avoid changing the orientation of the brush strokes in each frame of animation, giving the animated object a consistent look, as light sources typically do not change position between frames in contrast to view vectors. For example, Meier states this aesthetic preference in the second paragraph of

section 5.2: "*...we prefer to have brush strokes oriented with respect to the surface and not change as the surface animates.*" Therefore, it would have been obvious to further modify the combination of Meier and Arias to obtain the invention specified in claim 12.

30. With regard to claim 13, Meier discloses "the generating at least one of retouched image of the three-dimensional image includes generating at least one of retouched image by selecting any one of brush image to be arranged according to a predetermined condition" as shown in claim 15. Meier does not disclose "changing the brush image." At the time of the invention, it would have been obvious to a person of ordinary skill in the art to change the brush image. The suggestion for doing so is given by Meier in the third paragraph of section 3.3: "Using randomness is important in achieving a hand-crafted look; therefore, we can randomly perturb the brush stroke attributes based on user-selected parameters." Thus, the motivation for doing so would have been to give a hand crafted look of a painter changing strokes. Therefore, it would have been obvious to further modify the combination of Arias with Meier to obtain the invention specified in claim 13.

31. Claim 14 is met by the combination of Arias and Meier, wherein Meier discloses "the generating at least one of retouched image of the three-dimensional image includes generating at least one of retouched image by changing a size of each of the plurality of brush images to be arranged according to a predetermined condition" (*6th paragraph of section 3.2: "Finally, the brush **size** reference picture is a scalar image that encodes x and y scaling information. We linearly map the range of values in the image to the range of user-specified sizes so that the areas with small values are painted with the smallest brushes and the areas with high values are painted with the largest brushes."*).

32. Claim 15 is met by the combination of Arias and Meier, wherein Meier discloses "the generating at least one of retouched image of the three-dimensional image includes generating at least one of retouched image by selecting any one of brush image to be arranged according to a predetermined condition" (*Figure 3 shows selecting one brush image; Figure 5; section 3.1: "We employ a simple method that starts with a parametric surface and a desired number of particles."; 2nd paragraph of section 3: "Each brush stroke renders one particle."*).

33. Claim 16 is met by the combination of Arias and Meier, wherein Meier discloses "the arranging a plurality of brush images so as to superpose a part of the plurality of brush images on one another part of the plurality of brush images includes arranging the plurality of brush images so as to superpose a part of a predetermined number of brush images of the plurality of brush images on one another part of the plurality of brush images (*Figure 8 and caption: "Compositing a haystack from several layers. Each layer of the haystack is shown by itself on the left while its contribution to the composited image is shown on the right."*) in a predetermined direction from a position at which any one brush image of the plurality of brush images when arranging the plurality of brush images" (*3rd paragraph of section 3.3: "For example, we may specify that brush rotations be determined by an orientation reference picture, but to eliminate the mechanical look of the brushes lining up perfectly, we specify that we are willing to have brush orientations fall within the range of -10 to +20 degrees from the orientation given in the reference picture."*).

34. Claim 17 is met by the combination of Arias and Meier, wherein Meier discloses "the arranging a plurality of brush images so as to superpose a part of the plurality of brush images on one another part of the plurality of brush images includes arranging the plurality of brush images

so as to superpose the part of the predetermined number of brush images of the plurality of brush images (*Figure 8 and caption: "Compositing a haystack from several layers. Each layer of the haystack is shown by itself on the left while its contribution to the composited image is shown on the right."*) on one another part in the predetermined direction based on an arrangement angle of any one brush image of the plurality of brush images when arranging the plurality of brush images" (*3rd paragraph of section 3.3 (emphasis added): "For example, we may specify that brush rotations be determined by an orientation reference picture, but to eliminate the mechanical look of the brushes lining up perfectly, we specify that we are willing to have brush orientations fall within the range of <u>-10 to +20 degrees</u> from the orientation given in the reference picture."*).

35. Claim 18 is met by the combination of Arias and Meier, wherein Meier discloses "the generating at least one of retouched image of the three-dimensional image includes generating at least one of retouched image by shifting positions at which the plurality of brush images are arranged as time passes" (*7th paragraph of section 3.2: "Brush stroke position comes from the particle's position in screen space. Position may be modified by a function such as moving it in the direction of a velocity vector or adding noise."; Figure 7 shows the shifting of a plurality of brush images in a beach ball animation*).

36. Claim 19 is met by the combination of Arias and Meier, wherein Meier discloses "the generating at least one of retouched image of the three-dimensional image includes generating at least one of retouched image by shifting arrangement angles of the plurality of brush images as time passes" (*3rd paragraph of section 3.3 (emphasis added): "To maintain coherence, a seed is stored with each particle so that the same random perturbations will be used for a particular*

particle throughout an animation... For example, we may specify that brush rotations be determined by an orientation reference picture, but to eliminate the mechanical look of the brushes lining up perfectly, we specify that we are willing to have brush orientations fall within the range of -10 to +20 degrees from the orientation given in the reference picture.").

37. **Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,966,134 to Arias in view of Barbra J. Meier, "Painterly Rendering for Animation," Aug. 4, 1996, SIGGRAPH '96 Conference Proceedings, p. 477-484 (Meier) in view of Linda G. Shapiro and George C. Stockman, "Computer Vision," Jan. 23, 2001, p. 279-283 (Shapiro et al).**

38. With regard to claim 5, Meier discloses "the arranging a plurality of brush images so as to superpose a part of the plurality of brush images on one another part of the plurality of brush images includes arranging the plurality of brush images at positions within the rendering region on the basis of the shadow information calculated" (*Figure 8 shows arranging brush images according to shadow and highlight regions*). Meier discloses in the caption of Figure 8: "We used image processing techniques on the color reference picture to isolate the shadow and highlight areas to be painted separately." Meier does not expressly disclose specifics of the image processing techniques referenced, in particular that the "positions in which the brush images are placed satisfy a predetermined brightness condition."

39. With regard to claim 6, Meier discloses "the arranging a plurality of brush images so as to superpose a part of the plurality of brush images on one another part of the plurality of brush images includes generating a first retouched image by arranging the plurality of brush images at positions are determined by image properties and generating a second retouched image by

arranging the plurality of brush images at positions determined by reference image properties the rendering region on the basis of the shadow information (*Figure 8 shows a first, second, third and fourth retouched images, as well as arranging brush images according to shadow and highlight regions*). Meier discloses in the caption of Figure 8: "We used image processing techniques on the color reference picture to isolate the shadow and highlight areas to be painted separately." As shown in the previous paragraph, Meier does not expressly disclose specifics of the image processing techniques, in particular that the "positions in which the brush images are placed satisfy a predetermined brightness condition."

40. However, Shapiro et al discloses an image processing technique on a color image to isolate the shadow and highlighted areas based on "a predetermined brightness condition" (*section 10.1.1, p. 281: "In image analysis, the vectors represent pixels or sometimes small neighborhoods around pixels. The components of these vectors can include: 1. intensity values, 2. RGB values and color properties derived from them..."; Algorithm 10.1 on page 282; Figure 10.4 shows the results of K-means clustering*).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the K-means clustering algorithm to identify image regions based on a "predetermined brightness conditions" of the reference image, as taught by Shapiro et al, in the system disclosed by Meier. The motivation for doing so would have been to isolate shadow areas in the reference images in order to arrange the brush images for artistic effects (shown in Figure 8.) The suggestion for doing so is given by Meier in the caption of Figure 8: "We used image processing techniques on the color reference picture to isolate the shadow and highlight areas to be painted

separately." Therefore, it would have been obvious to combine Meier with Shapiro to obtain the invention specified in claims 5 and 6.

Response to Arguments

41. Applicant's arguments filed August 14, 2006 have been fully considered but they are not persuasive.

Non-Statutory Subject Matter

42. The amendments to claims 20 and 22 do not overcome the rejections under 35 USC 101 as the claims are still directed to non-statutory natural phenomena.

In response to the arguments: One of ordinary skill would not have been motivated to combine Arias and Meier and Arias teaches away from the subject matter recited in the claims

43. Applicant argues the teachings of Meier defeat the purpose of the method disclosed in Arias, citing lines 46-64 of column 1 in the background section. It should be noted that Arias is comparing non-photorealistic rendering to conventional photorealistic rendering. In the summary of the invention, Arias characterizes the disclosed rendering method as "simulating hand-drawn animation cels" (lines 22-23 of column 2). Toward this end, Arias employs a particular style that is characterized by contouring the edges of an object and filling the interior of contoured areas with color. Similarly, Meier discloses a method for generating images with a "hand-crafted appearance" by rendering simulated colored brush strokes. In lines 40-46 of column 7 (cited by Applicant), Arias contrasts the invention with "conventional rendering," where the objective is to produce an image that is "as life-like as possible." Meier does not fit into this category of rendering procedures. Similar to Arias, the method disclosed by Meier creates images with a "hand-crafted appearance." Arias never discloses that the addition of

simulated hand painted brush strokes would defeat the purpose of simulating hand-drawn appearance of a cartoon. Furthermore, one of ordinary skill in the art would not be discouraged from combining Meier and Arias by the statements of Arias contrasting non-photorealistic rendering with conventional photorealistic rendering.

44. One of ordinary skill in the art at the time of the invention would be motivated to incorporate the teachings of Meier in the invention disclosed by Arias to achieve a stylistic effect, a painter's brush strokes, to emphasize a characteristic of the scene. For an example of such an effect, Applicant's attention is directed to the reference Adam Lake, Carl Marshall, Mark Harris, Marc Blackstein, "Stylized Rendering Techniques For Scalable Real-Time 3D Animation," June 5, 2000, Proceedings of the First International Symposium on Non-Photorealistic Animation and Rendering, p. 13-20 (Lake et al). In Figure 15, Lake et al show a cartoon-shaded duck for cel animation that uses a "Painter," a shader simulating painterly effects, and an "Inker," a shader that creates dark contours similar to those of Arias. One of ordinary skill in the art could produce such an image by combining the teachings of Arias and Meier.

<u>Arias does not disclose features recited in the claims</u>

45. With regard to claims 1 and 21, Applicant argues that Arias does not teach "rendering in real time a three-dimensional object." However, "rendering in real time a three-dimensional object" is not recited in claim 21 nor does it flow inherently therefrom. With respect to claim 1, the recitation of "rendering in real-time" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process, and where the body of the claim does not

depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Conclusion

46. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent No. 5,592,597 to Kiss discloses rendering images using brush primitives. U.S. Patent No. 6,268,865 discloses simulating painting three-dimensional images. Lee Markosian, Michael A. Kowalski, Daniel Goldstein, Samuel J. Trychin, John F. Hughes, Lubomir D. Bourdev, "Real-Time Nonphotorealistic Rendering," August 1997, Proceedings of the 24th Annual Conference On Computer Graphics And Interactive Techniques, p.415-420, and Jeff Lander, "Shades of Disney: Opaquing a 3D World," Game Developer Magazine, March 2000 disclose non-photorealistic rendering in real time.

47. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Repko whose telephone number is 571-272-8624. The examiner can normally be reached on Monday through Friday 8:30 am -5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on 571-272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JMR

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